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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/641,308	LAROIA ET AL.
	Examiner	Art Unit
	VAIBHAV (MANU) SAWHNEY	2616

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-60* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15,17-21,24,25,28-36,38,39,41,44-49,51-57,59 and 60* is/are rejected.

7)☒ Claim(s) *16, 22, 23, 26, 27, 37, 40, 42, 43, 50, 58* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *03/17/2004*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because on page 18, line 28, it appears to be that the tone symbol 514 that includes an in-phase component 516 and a quadrature component 518 should actually be, "in-phase component 518 and a quadrature component 516." It appears to be reversed. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 18 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 18 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant

regards as the invention. It is not clear as to why the scaling factor will be increased to increase the power when the quality is increasing.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 2, 19, 30 are rejected under 35 U.S.C. 102(b) as being unpatentable by Bohnke (6,160,791).

8. As to claim 1, Bohnke shows modulating first control information on a single tone to generate a first control signal comprising information (includes said first control information) to be transmitted in signals is modulated onto a number of subcarriers in a frequency domain. An OFDM-system is a multi-subcarrier system, in which the subcarriers are orthogonal to each other. The information to be transmitted by means of said subcarriers comprises normal data information and power control information (said first control information). The power control information is used to control the transmission power of a bidirectional communication system (Col. 2, lines 10-21; Fig. 2).

Regarding claimed single tone in the first element, Bohnke further shows the plurality of subcarriers in an OFDM-system can be allocated to a variable number of

channels, each channel containing a variable number of subcarriers depending on information to be transmitted (Col. 1, lines 13-17). Further, only one subcarrier (single tone) in a number of subcarriers, e.g. within a frequency slot or within a frequency channel, carries said phase reference information and said power control information (Col. 3,lines 1-4).

Bohnke further shows transmitting said first control signal using said single tone during a single orthogonal frequency division multiplexed symbol transmission time period comprising transmission of the information in said signals (said first control signal) onto a number of subcarriers in a frequency domain according to an OFDM-modulation method, said information including a power control information, wherein one of said subcarriers carries a phase reference information, transforming said signals into the time domain (including single or plurality of OFDM symbol time periods). Then, transmitting said transformed signals, characterized in that in said modulating step said power control information is modulated onto said phase reference subcarrier carrying said phase reference information (Col. 2, lines 43-51).

9. As to claim 2, Bohnke shows said first control information being transmission power control information corresponding to a first wireless terminal comprising the information to be transmitted by means of said subcarriers that contains normal data information and power control information (said first control information) (Col. 1, lines 17-19). Further, The power control information is used to control the transmission power of a bidirectional communication system. Thereby, the principle of the power control is

to maintain a certain quality of transmission for the transmitted signals. The power control of a bidirectional communication system including for example a station A (first wireless terminal) and a station B (2^{nd} wireless terminal or base station) is explained in the following. If the station B receives signals from the station A, station B detects the quality of the received signals and asks the station A by transmitting a power control information to increase, keep or decrease the transmission power of the station A. The station A receives therefore the power control demand from the station B and adjusts its transmission power correspondingly (Col. 1, lines 19-32).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 3, 4, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bohnke (6,160,791), in view of Takeuchi (6,408,038).

12. As to claim 3, Bohnke shows all the elements except said first control information is transmission frequency control information. Takeuchi shows said first control information is transmission frequency control information corresponding to a first wireless terminal comprising an AFC (automatic frequency control) circuit that receives the synchronous TFPR signal, and obtains a frequency error (said first control

information) and a timing error of the received signal to control the frequency and the timing. Further, with the TFPR signal, the frequency and timing of the having received signal or the receiving signal are controlled (said frequency control information) (Col. 3, lines 16-18). Thus, the frequency of a carrier of the receiver side can be exactly controlled that is, controlling said first control information that includes frequency control information. Therefore, it would have been obvious to one of ordinary skilled in the art to modify the method of Bohnke to include frequency information for timely synchronization and avoid data loss and interference.

13. As to claim 4, Bohnke shows all the elements except said first control information is transmission timing control information. Takeuchi shows said first control information is transmission timing control information corresponding to a first wireless terminal comprising an AFC (automatic frequency control) circuit that receives the synchronous TFPR signal, and obtains a frequency error and a timing error (timing control information) of the received signal to control the frequency and the timing. Further, with the TFPR signal, the frequency and timing of the having received signal or the receiving signal are controlled (said timing control information) (Col. 3, lines 16-18). Thus, the timing of a carrier of the receiver side can be exactly controlled, that is, controlling said first control information that includes timing control information. Therefore, it would have been obvious to one of ordinary skilled in the art to modify the method of Bohnke to include timing information for timely synchronization and avoid data loss and interference.

14. Claims 5-9, 25, 28, 32-34, 41, 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bohnke (6,160,791), in view of Takeuchi (6,408,038), further in view of Struhsaker (5,923,651).

15. As to claim 5, Bohnke and Takeuchi show all the elements except said first control signal includes an In-phase component and a Quadrature component, said first control information being modulated on a first single one of said In-phase and Quadrature components.

Struhsaker shows said first control signal includes an In-phase component and a Quadrature component, said first control information being modulated on a first single one of said In-phase and Quadrature components comprising the in-phase and quadrature components being impressed upon a carrier wave, which is then transmitted at a radio frequency (said first control signal). At the same time, similar baseband signals (comprising in-phase and quadrature components) for other subscribers are impressed upon carrier waves and transmitted at the same radio frequency (Fig. 1-3; Col. 9, lines 19-35). Therefore, it would have been obvious to one of ordinary skilled in the art to modify the method of Bohnke and Takeuchi to be able to store and transport more amount of data in a limited amount of bandwidth by using various phase reference.

16. As to claim 6, Bohnke and Takeuchi show all the elements except modulating second control information corresponding to a second wireless terminal on said single tone, on a second single one of said In-phase and Quadrature components, said second single one of said In-phase and Quadrature components being different from said first single one of said In-phase and Quadrature components.

However, Struhsaker shows modulating second control information corresponding to a second wireless terminal on said single tone, on a second single one of said In-phase and Quadrature components, said second single one of said In-phase and Quadrature components being different from said first single one of said In-phase and Quadrature components comprising the in-phase and quadrature components being impressed upon a carrier wave, which is then transmitted at a radio frequency. At the same time, similar baseband signals (comprising in-phase and quadrature components) for other subscribers are impressed upon carrier waves (that includes second control information and plurality of said control information for various subscribers) (Col. 9, lines 32-37). Further, it is shown that there are plurality of transmitters 30 at respective subscriber terminals 20 in a coverage area receiving a data bitstream for the respective subscriber. Each of the transmitters 30 processes the data bitstream, which it receives. In particular, in each transmitter 30, the respective data bitstream is incrementally divided into discrete bit sequences, where each bit sequence corresponds to a complex signal state defined by a particular combination of in-phase and quadrature components (distinct in-phase and quadrature components for different subscribers). The bit sequences are mapped to appropriate in-phase and

quadrature components, which are then coded with a code distinct to the subscriber of the particular subscriber terminal 20, that is, the in-phase and quadrature components are distinct (different) for individual transmitters in plurality of subscriber terminals 20. The baseband signal for the subscriber is up converted. (Fig. 1-3; Col. 9, lines 19-35). Therefore, it would have been obvious to one of ordinary skilled in the art to modify the method of Bohnke and Takeuchi to have distinct I and Q components to avoid interference and allow more data to flow through in a limited bandwidth.

17. As to claim 7, Bohnke show operating said first wireless terminal to receive said first control signal and adjusting a transmission power level as a function of the first control information modulated on said first control signal comprising the information to be transmitted by means of said subcarriers comprises normal data information and power control information (said first control signal). The power control information is used to control the transmission power of a bidirectional communication system. Thereby, the principle of the power control is to maintain a certain quality of transmission for the transmitted signals. The power control of a bidirectional communication system includes a station A (first wireless terminal) and a station B (wireless terminal/base station. If the station B receives signals from the station A, station B detects the quality of the received signals and asks the station A by transmitting a power control information to increase, keep (no power change) or decrease the transmission power of the station A. The station A receives therefore the power control demand (on said first control signal) from the station B and adjusts its

transmission power correspondingly. If the station A receives signals from the station B, the station A detects the quality of the received signals and asks the station B by transmitting a power control information to increase, keep or decrease the transmission power of the station B. The station B therefore receives the power control demand from the station A and adjusts its transmission power correspondingly. So each of the stations controls the transmission power of the other station (Col. 1, lines 17-39).

18. As to claim 8, Bohnke, Takeuchi, and Struhsaker show different amounts of power (including different amounts of I and Q components) being assigned to various stations in the network. However, they do not show the second single one of said In-phase and Quadrature phase components is transmitted with no more than 10% of the power that is used to transmit said first single one of said In-phase and Quadrature components.

However, it would have been obvious to one of ordinary skilled in the art at the time of invention to combine the three references to implement any percentage of power in order to conserve network resources including bandwidth and power.

In regards to this, MPEP 2144.05 states the following:

II. OPTIMIZATION OF RANGES

A. Optimization Within Prior Art Conditions or Through Routine Experimentation

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such

concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997).

19. As to claim 9, Bohnke shows the power transmitted on the second signal one of said In-phase and Quadrature components is zero comprising the power control information to be transmitted represents an "UP"-power control information, a "DOWN"

power control information or a "KEEP" power control information. The "KEEP" power control information detected in the receiving apparatus is used to keep the same transmission power in the transmission apparatus, which is interpreted as power signal that is sent is zero in order to hold the power at the then current power level (power signal being composed of in-phase and quadrature component from the parent claim), and stop the power from getting adjusted (Col. 3, lines 27-30; Col. 3, lines 36-38).

20. Claims 10-15, 17, 35, 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bohnke (6,160,791), in view of Takeuchi (6,408,038), further in view of Struhsaker (5,923,651), in further view of Minami et al. (6,587,510).

21. As to claim 10, Bohnke, Takeuchi, and Struhsaker shows all the elements except said modulating step includes performing an amplitude modulation operation to modulate said first control information on said first single one of said In-phase and Quadrature components, said modulation for single one of said In-phase and Quadrature components including assigning, as a function of said first control information, a single value from a set of at least 3 possible values.

However, Minami et al. show said modulating step includes performing an amplitude modulation operation to modulate said first control information on said first single one of said In-phase and Quadrature components comprising the control data (first control information) that is assigned to a pair of symbols "a" and "b" having the longest Euclidian distance to map the contrary control data (i.e., up command and down

command) on the symbols of QPSK modulation. Further, control data are assigned to symbols of other phase modulation (step of modulation) such as 8-PSK (Phase Shift Keying) and 16-QAM (Quadrature Amplitude Modulation) (Col. 12, lines 54-62).

Further, Minami et al. further show said modulation for single one of said In-phase and Quadrature components including assigning, as a function of said first control information, a single value from a set of at least 3 possible values comprising the control section 8 generates the control data (first control information) which (assigns) lowers the transmission power by 1 dB (1st value) if the carrier to interference power ratio I/C is larger than a first threshold value, generates the control data which raises (reassigns) the transmission power by 1 dB (2nd value) if the carrier to interference power ratio I/C is smaller than a second threshold value, and generates (modulates) the control data (first control information) which holds the current transmission power (which is interpreted as a value of zero (0) dB; 3rd value) if the carrier to interference power ratio I/C is between the first and the second threshold values. Based on these control data, the control symbol S9 is generated (Col. 6, lines 15-25; Fig 1, 3, 4, 5, 8, and 9). Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the method Bohnke, Takeuchi, and Struhsaker to adjust the power values of various mobile terminals in order to conserve resources and reduce interference among various wireless/mobile terminals.

22. As to claim 11, Bohnke, Takeuchi, and Struhsaker shows all the elements except wherein at least one of the 3 possible values is zero indicating no change in transmission power is to be made by said first wireless terminal.

Minami et al. show wherein at least one of the 3 possible values is zero indicating no change in transmission power is to be made by said first wireless terminal comprising the control section 8 generates the control data (first control information) which (assigns) lowers the transmission power by 1 dB (1st value) if the carrier to interference power ratio I/C is larger than a first threshold value, generates the control data which raises (reassigns) the transmission power by 1 dB (2nd value) if the carrier to interference power ratio I/C is smaller than a second threshold value, and generates (modulates) the control data (first control information) which holds the current transmission power (which is interpreted as a value of zero (0) dB; 3rd value) if the carrier to interference power ratio I/C is between the first and the second threshold values. Based on these control data, the control symbol S9 is generated (Col. 6, lines 15-25; Fig. 1; Fig 1, 3, 4, 5, 8, and 9). Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the method Bohnke, Takeuchi, and Struhsaker to adjust the power values of various mobile terminals in order to conserve resources and reduce interference among various wireless/mobile terminals.

23. As to claim 12, Bohnke, Takeuchi, and Struhsaker shows all the elements except wherein said set of possible values includes a predetermined interval of possible values.

Minami et al. show wherein said set of possible values includes a predetermined interval of possible values comprising the control section 8 that generates the control data which lowers the transmission power by 1 dB if the carrier to interference power ratio I/C is larger than a first threshold value, generates the control data which raises the transmission power by 1 dB if the carrier to interference power ratio I/C is smaller than a second threshold value, and generates the control data which holds the current transmission power if the carrier to interference power ratio I/C is between the first and the second threshold values (Col. 6, lines 16-24), that is, there is a predetermined interval of possible values that can be assigned to various mobile/wireless terminals.

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the method Bohnke, Takeuchi, and Struhsaker to restrict the power being assigned to various wireless terminals to conserve network resources and reduce interference in the network.

24. As to claim 13, Bohnke, Takeuchi, and Struhsaker shows all the elements except wherein said control information is a single value which can be any one of at least three values, one of said at least 3 values being zero indicating no change in transmission power is to be made by said first wireless terminal, said step of modulating control information including mapping said single value to one of at least three signal amplitude levels, a zero control value being mapped to a zero amplitude value of the amplitude modulated signal.

However, Minami et al. show wherein said control information is a single value which can be any one of at least three values, one of said at least 3 values being zero indicating no change in transmission power is to be made by said first wireless terminal, said step of modulating control information including mapping said single value to one of at least three signal amplitude levels, a zero control value being mapped to a zero amplitude value of the amplitude modulated signal comprising the control data are assigned to symbols of other phase modulation (step of modulation) such as 8-PSK (Phase Shift Keying) and 16-QAM (Quadrature Amplitude Modulation) (Col. 12, lines 54-62). The control section 8 generates the control data (first control information) which (assigns/maps) lowers the transmission power by 1 dB (1st value) if the carrier to interference power ratio I/C is larger than a first threshold value, generates the control data which raises (reassigns) the transmission power by 1 dB (2nd value) if the carrier to interference power ratio I/C is smaller than a second threshold value, and generates (modulates) the control data (first control information) which holds the current transmission power (which is interpreted as a value of zero (0) dB being mapped to a zero amplitude value of the amplitude modulated signal; 3rd value) if the carrier to interference power ratio I/C is between the first and the second threshold values. Based on these control data, the control symbol S9 is generated (Col. 6, lines 15-25; Fig. 1; Fig 1, 3, 4, 5, 8, and 9). Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the method Bohnke, Takeuchi, and Struhsaker to adjust the power values of various mobile terminals in order to conserve resources and reduce interference among various wireless/mobile terminals.

25. As to claim 14, Bohnke, Takeuchi, and Struhsaker show all the elements except wherein said modulating includes performing amplitude modulation.

However, Minami et al. show wherein said modulating includes performing amplitude modulation comprising the control data are assigned to symbols of other phase modulation (control data is modulated) such as 8-PSK (Phase Shift Keying) and 16-QAM (Quadrature Amplitude Modulation) (Col. 12, lines 54-62). Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the method Bohnke, Takeuchi, and Struhsaker to transport higher amount of data in a limited amount of bandwidth.

26. As to claim 15, Bohnke, Takeuchi, and Struhsaker shows all the elements except multiplying the amplitude modulated one of the In-phase and Quadrature components by a first scaling factor, said first scaling factor being a function of downlink quality report information so far received from the wireless terminal to which the modulated one of the In-phase and Quadrature components corresponds.

However, Minami et al. show multiplying the amplitude modulated one of the In-phase and Quadrature components by a first scaling factor, said first scaling factor being a function of downlink quality report information so far received from the wireless terminal to which the modulated one of the In-phase and Quadrature components corresponds comprising the base station and the communication terminal device check the reception power (or the quality of reception signal) between each other and inform

each other of the checked result to form a feedback loop, so that communication under minimum transmission power, so-called transmission power control, is performed. Thereby, the cellular wireless communication system can efficiently communicate under minimum transmission power and reduce power consumption comparing to the case of communicating under constant power (Col. 1, lines 26-35).

Regarding the scaling factor, Minami et al. show the changeable gain amplifier 18 receives the power control signal S8 from the control section 8, and amplifies the transmission signal S13 (multiplies) by the gain value (scaling factor) based on the power control signal S8 so as to generate the transmission signal S14 of transmission power instructed by the base station 2. The transmitting circuit 19 performs a predetermined high frequency processing such as frequency conversion on the transmission signal S14 to generate transmission signal S15, which is transmitted via an antenna 20. Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the method Bohnke, Takeuchi, and Struhsaker to control the power being transmitted to reduce interference in the network and also to extend the battery life of the mobile station.

As to claim 17, Bohnke, Takeuchi, and Struhsaker shows all the elements except operating the wireless terminal to receive the scaled amplitude modulated signal; and operating the wireless terminal to multiply the received signal by a second scaling factor that is a function of the downlink quality information previously sent by said wireless terminal.

Minami et al. show operating the wireless terminal to receive the scaled amplitude modulated signal; and operating the wireless terminal to multiply the received signal by a second scaling factor that is a function of the downlink quality information previously sent by said wireless terminal comprising the receiving section 7 of the communication terminal device 3 (wireless terminal) receives a (modulated) transmission signal from the base station 2 to demodulate the sent transmission data, and simultaneously detects control data for power control included in the transmission signal to inform the control section 8 of the detected control data. Further, the receiving section 7 detects the carrier to interference power ratio C/I of the transmission signal sent from the base station 2, and also informs the control section 8 of the detected carrier to interference power ratio C/I (Col. 4, lines 45-54; Fig. 1 and Fig. 3).

Further, Minami et al. discloses a changeable gain amplifier 18 receives the power control signal S8 from the control section 8 (which is coupled to a quality detection unit, thus changes power based on the received quality information), and amplifies (multiplies) the transmission signal S13 by the gain value based on the power control signal S8 (quality reception) so as to generate the transmission signal S14 of transmission power instructed by the base station 2 (wireless terminal).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the method of Bohnke to avoid wasting power resources and reduce interference.

27. As to claim 19, Bohnke shows periodically transmitting a first set of said modulated power control signals corresponding to a first wireless terminal, at least some of said first set of modulated power control signals being modulated on different tones during different orthogonal frequency division multiplexed symbol transmission time periods comprising modulation means for modulating information to be transmitted in said signals (power control signals) onto a number of subcarriers (different tones) in the frequency domain according to an OFDM-modulation method, said information including a power control information generated in a power control information means, whereby one of said subcarriers carries a phase reference information, transformation means for transforming said modulated signals into the time domain (that includes plurality of OFDM time periods) and transmission means for transmitting said transformed signals (Col. 2, lines 8-17).

28. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bohnke (6,160,791) in view of Sakoda et al. (6,230,022).

29. As to claim 20, Bohnke shows all the elements except the tones used to modulate said first set of modulated power control signals is determined by a first predetermined hopping sequence.

Sakoda et al. show the tones used to modulate said first set of modulated power control signals is determined by a first predetermined hopping sequence comprising one frequency slot is comprised of plural orthogonal sub-carriers, and, at the time of

communication, information to be transmitted (power control information) is allocated to the plural sub-carriers and then transmitted by utilizing the frequency slot (Fig. 4). Therefore, the information to be transmitted can be distributed on the frequency axis and transmitted (Col. 6, lines 59-65). Further, a frequency slot to be used for communication is changed, temporally, on the basis of a stated pattern (predetermined pattern), that is, a frequency hopping is performed. Sakoda et al. further gives an example where there are nine frequency slots F1 to F9 allocated to the transmitting apparatus 11 and these nine frequency slots F1 to F9 form nine down communication channels A to I, the frequency slots F1 to F9 are not univocally allocated to nine channels of the down communication channels A to I, but each of down communication channels A to I decides the frequency slot F1 to F9 to be used, for each time slot (Fig. 5; Col. 7, lines 1-12).

Therefore, it would have been obvious to one of ordinary skilled in the art to modify the method of Bohnke to provide a predetermined frequency hopping to reduce the level of interference in the OFDM network.

30. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bohnke (6,160,791) in view of Sakoda et al. (6,230,022), further in view of Nyman et al. (2003/0037033).

31. As to claim 21, Bohnke and Sakoda et al. show all the elements except the first predetermined hopping sequence corresponds to a terminal identifier associated with the first wireless terminal.

However, Nyman et al. show the first predetermined hopping sequence corresponds to a terminal identifier associated with the first wireless terminal comprising the pattern of the hops (frequency hopping sequence) is a pseudo-random pattern, which is based on the device's Bluetooth Device (wireless terminal) Address (BD_ADDR) value (Paragraph 0164; Fig. 2A). Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to provide frequency hopping sequence based on a terminal identifier so as to achieve unique hopping sequence based on the individual wireless device, thus reducing interference overall in the network.

32. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bohnke (6,160,791), in view of Takeuchi (6,408,038), further in view of Struhsaker (5,923,651), in further view of Love et al. (2002/0145985).

33. As to claim 24, Bohnke, Takeuchi, and Struhsaker show all the elements except operating the wireless terminal to ignore the received power control information when the unused one of the In-phase and Quadrature components includes power above a preselected threshold.

However, Love et al. show operating the wireless terminal to ignore the received power control information when the unused one of the In-phase and Quadrature components includes power above a preselected threshold comprising DPTRCH frames includes fields that are always sent (e.g., power control bits, pcb's, that is, power control information on the signal that is made up of In-phase and quadrature components in parent claims) and fields which are only sent when mobile unit 104 (wireless terminal) is receiving the SHCCH (e.g., a pointer field, or pntr) then a relative energy (power) comparison is possible. That is, processor 114 (of the wireless terminal in Fig. 1) determines energy of the pointer field (`Eptr`) and energy of the power control bits (`Epcb`). Processor 114 compares Eptr to Epcb, for example by determining a ratio Eptr/Epcb, and compares the data field energy comparison to a comparison threshold stored in memory 116 (e.g., comparing Eptr/Epcb to a threshold_4). Processor 114 of the wireless terminal then determines whether to ignore a frame or decode a frame based on the comparison of the data field energy comparison to the comparison threshold (Page 10, paragraph 0105). Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the method of Bohnke to prevent receiving data, which was intended for another mobile unit and thus prevent from incorrectly decoding data that was intended for the mobile unit.

34. As to claim 25, Bohnke shows transmitting a plurality of power control signals to said first wireless terminal over a period of time comprising modulation means for modulating information to be transmitted in said signals (plurality of power control

signals) onto a number of sub carriers in the frequency domain according to an OFDM-modulation method, said information including a power control information generated in a power control information means, whereby one of said sub carriers carries a phase reference information, transformation means for transforming said modulated signals into the time domain (that is, over a period of time) and transmission means for transmitting said transformed signals to other mobile station (Col. 2, lines 8-17).

However, Bohnke does not show transmitting a periodic device identifier signal on the second single one of the In-phase and Quadrature signal components of at least 50% less frequently than the power control signals transmitted to said first wireless terminal.

However, MPEP 2144.05 states the following:

II. OPTIMIZATION OF RANGES

A. Optimization Within Prior Art Conditions or Through Routine Experimentation

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be *prima facie* obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), *cert. denied*, 493 U.S. 975 (1989); *In re Kulling*, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and *In re Geisler*, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997).

35. As to claim 28, Bohnke show a method wherein one of the possible modulated signal values corresponds to a control command indicating no change in power; and wherein transmitting said first control information includes transmitting said signal tone with zero power when said first control information indicates no change in power comprising the information to be transmitted by means of said subcarriers comprises normal data information and power control information (said first control signal), which is

transmitting said first control information. The power control information is used to control the transmission power of a bidirectional communication system. Thereby, the principle of the power control is to maintain a certain quality of transmission for the transmitted signals. Bohnke further shows by example where the power control of a bidirectional communication system includes a station A (first wireless terminal) and a station B (wireless terminal/base station. If the station B receives signals from the station A, station B detects the quality of the received signals and asks the station A by transmitting a power control information to increase, keep (no change in power, which is also interpreted as zero power) or decrease the transmission power of the station A. The station A receives therefore the power control demand (on said first control signal) from the station B and adjusts its transmission power correspondingly. If the station A receives signals from the station B, the station A detects the quality of the received signals and asks the station B by transmitting a power control information to increase, keep or decrease the transmission power of the station B. The station B therefore receives the power control demand from the station A and adjusts its transmission power correspondingly. So each of the stations controls the transmission power of the other station (Col. 1, lines 17-39).

36. Claims 29 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bohnke (6,160,791), in view of Takeuchi (6,408,038), further in view of Struhsaker (5,923,651), in further view of Hornsby et al. (6,396,803).

37. As to claim 29, Bohnke, Takeuchi, and Struhsaker show all the elements except a method wherein said power control signal is transmitted in a first sector corresponding to a base station, the method comprising: operating the base station to control a second sector adjacent to said first base station to leave the tone used by said first power control signal unused in said second sector when said first control signal is transmitted.

However, Hornsby et al. show wherein said power control signal is transmitted in a first sector corresponding to a base station, the method comprising: operating the base station to control a second sector adjacent to said first base station to leave the tone used by said first power control signal unused in said second sector when said first control signal is transmitted comprising a sectorized/cellular environment where the available frequency (signal containing control and data info) is divided such that the downstream and upstream channels (containing power control information) assigned to each CPE (terminal) are interleaved (same frequency/tone is left, not used in the adjacent sector/cell) with those assigned to CPEs (terminals) in other sectors or cells. Thus, some communication channels are not available to the CPEs (terminals) of a particular sector or cell (Col. 5, lines 44-49; Fig. 1). The base station is shown in Fig. 1 as a headend transceiver. Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the apparatus of Bohnke, Takeuchi, and Struhsaker to leave the tones in adjacent sectors/cells to reduce interference.

38. As to claim 30, Bohnke shows an apparatus comprising a modulator for modulating first control information on a single tone to generate a first control signal;

and a transmitter (12) coupled to said modulator (7) for transmitting (by a transmitter 12 in Fig. 2) said first control signal using said single tone during a single orthogonal frequency division multiplexed symbol transmission time period comprising information (includes said first control information) to be transmitted in signals is modulated (by a modulator 7 in Fig. 2) onto a number of subcarriers in a frequency domain. An OFDM-system is a multi-subcarrier system, in which the subcarriers are orthogonal to each other. The information to be transmitted by means of said subcarriers comprises normal data information and power control information (said first control information). The power control information is used to control the transmission power of a bidirectional communication system (Col. 2, lines 10-21; Fig. 2).

Regarding claimed single tone in the first element, Bohnke further shows the plurality of subcarriers in an OFDM-system can be allocated to a variable number of channels, each channel containing a variable number of subcarriers depending on information to be transmitted (Col. 1, lines 13-17; Fig. 1 and 2). Further, only one subcarrier (single tone) in a number of subcarriers, e.g. within a frequency slot or within a frequency channel, carries said phase reference information and said power control information (Col. 3,lines 1-4).

Bohnke further shows a transmitter (12) transmitting said first control signal using said single tone during a single orthogonal frequency division multiplexed symbol transmission time period comprising transmission of the information in said signals (said first control signal) onto a number of subcarriers in a frequency domain according to an OFDM-modulation method, said information including a power control information,

wherein one of said subcarriers carries a phase reference information, transforming said signals into the time domain (including single or plurality of OFDM symbol time periods). Then, transmitting said transformed signals, characterized in that in said modulating step said power control information is modulated onto said phase reference subcarrier carrying said phase reference information (Col. 2, lines 43-51).

39. As to claim 31, Bohnke shows an apparatus wherein said first control information is one of transmission power control information comprising the information to be transmitted by means of said subcarriers that contains normal data information and power control information (said first control information) (Col. 1, lines 17-19). Further, The power control information is used to control the transmission power of a bidirectional communication system. Thereby, the principle of the power control is to maintain a certain quality of transmission for the transmitted signals. The power control of a bidirectional communication system including for example a station A (first wireless terminal; apparatus) and a station B (2nd wireless terminal or base station; apparatus) is explained in the following. If the station B receives signals from the station A, station B detects the quality of the received signals and asks the station A by transmitting a power control information to increase, keep or decrease the transmission power of the station A. The station A receives therefore the power control demand from the station B and adjusts its transmission power correspondingly (Col. 1, lines 19-32).

However, Bohnke does not show an apparatus wherein said first control information is transmission frequency control information, and transmission timing control information corresponding to said wireless terminal.

Takeuchi shows show an apparatus wherein said first control information is transmission frequency control information, and transmission timing control information corresponding to said wireless terminal comprising an AFC (automatic frequency control) circuit that receives the synchronous TFPR signal, and obtains a frequency error (said first control information) and a timing error of the received signal to control the frequency and the timing. Further, with the TFPR signal, the frequency and timing of the having received signal or the receiving signal (by a receiver 4; apparatus in Fig. 7) are controlled (said frequency control information) (Col. 3, lines 16-18; Fig. 7). Thus, the frequency of a carrier of the receiver side can be exactly controlled that is, controlling said first control information that includes frequency control information. Therefore, it would have been obvious to one of ordinary skilled in the art to modify the apparatus of Bohnke to include frequency information for timely synchronization and avoid data loss and interference.

40. As to claim 32, Bohnke and Takeuchi show all the elements except an apparatus wherein said first control signal includes an In-phase component and a Quadrature component; and wherein said modulator is an amplitude modulator for amplitude modulating first control information on a first single one of said In-phase and Quadrature components.

Struhsaker shows an apparatus wherein said first control signal includes an In-phase component and a Quadrature component; and wherein said modulator is an amplitude modulator for amplitude modulating first control information on a first single one of said In-phase and Quadrature components comprising the in-phase and quadrature components being impressed (modulated by a modulator in Fig. 2) upon a carrier wave, which is then transmitted at a radio frequency (said first control signal). At the same time, similar baseband signals (comprising in-phase and quadrature components) for other subscribers are impressed upon carrier waves and transmitted at the same radio frequency (Fig. 1-3; Col. 9, lines 19-35). He further shows quadrature and amplitude (QAM) modulation constellations, which may be utilized in the transmission and reception of signals in telecommunications system, such as in exemplary transmitter 30 and receiver 52 (apparatus) (Fig. 2, Fig. 4A-4F; Col. 9, lines 66-67; Col. 10, lines 1-3). Therefore, it would have been obvious to one of ordinary skilled in the art to modify the apparatus of Bohnke and Takeuchi to be able to store and transport more amount of data in a limited amount of bandwidth by using various phase reference.

41. As to claim 33, Bohnke and Takeuchi show all the elements except an apparatus wherein said modulator further modulates second control information corresponding to a second wireless terminal on said single tone, on a second single one of said In-phase and Quadrature components, said second single one of said In-phase and Quadrature

components being different from said first single one of said In-phase and Quadrature components.

However, Struhsaker shows an apparatus wherein said modulator further modulates second control information corresponding to a second wireless terminal on said single tone, on a second single one of said In-phase and Quadrature components, said second single one of said In-phase and Quadrature components being different from said first single one of said In-phase and Quadrature component comprising the in-phase and quadrature components being impressed upon a carrier wave, which is then transmitted at a radio frequency. At the same time, similar baseband signals (comprising in-phase and quadrature components) for other subscribers are impressed upon carrier waves (that includes second control information and plurality of said control information for various subscribers) (Col. 9, lines 32-37). Further, it is shown that there are plurality of transmitters 30 (apparatus) at respective subscriber terminals 20 (apparatus) in a coverage area receiving a data bitstream for the respective subscriber. Each of the transmitters 30 processes the data bitstream, which it receives. In particular, in each transmitter 30, the respective data bitstream is incrementally divided into discrete bit sequences, where each bit sequence corresponds to a complex signal state defined by a particular combination of in-phase and quadrature components (distinct in-phase and quadrature components for different subscribers). The bit sequences are mapped to appropriate in-phase and quadrature components, which are then coded with a code distinct to the subscriber of the particular subscriber terminal 20, that is, the in-phase and quadrature components are distinct (different) for individual

transmitters in plurality of subscriber terminals 20. The baseband signal for the subscriber is up converted. (Fig. 1-3; Col. 9, lines 19-35). Therefore, it would have been obvious to one of ordinary skilled in the art to modify the apparatus of Bohnke and Takeuchi to have distinct I and Q components to avoid interference and allow more data to flow through in a limited bandwidth.

42. As to claim 34, Bohnke shows an apparatus wherein the power transmitted on the second single one of said In-phase and Quadrature components is zero comprising the power control information to be transmitted represents an "UP"-power control information, a "DOWN" power control information or a "KEEP" power control information. The "KEEP" power control information detected in the receiving apparatus is used to keep the same transmission power in the transmission apparatus, which is interpreted as power signal that is sent is zero dB in order to hold the power at the then current power level (power signal being composed of in-phase and quadrature component in Fig. 3), and stop the power from getting adjusted (Col. 3, lines 27-30; Col. 3, lines 36-38; Fig. 2 and Fig. 3).

43. As to claim 35, Bohnke, Takeuchi, and Struhsaker shows all the elements except an apparatus wherein said modulator includes means for mapping said first control information to a single value from a set of at least 3 possible values which may be amplitude modulated on said first one of said In-phase and Quadrature phase signal

components; and wherein at least one of the 3 possible values is zero indicating no change in transmission power is to be made by said wireless terminal.

However, Minami et al. show an apparatus wherein said modulator includes means for mapping said first control information to a single value from a set of at least 3 possible values which may be amplitude modulated on said first one of said In-phase and Quadrature phase signal components; and wherein at least one of the 3 possible values is zero indicating no change in transmission power is to be made by said wireless terminal comprising the control data are assigned to symbols of other phase modulation (modulator in apparatus 17 in Fig. 3) such as 8-PSK (Phase Shift Keying) and 16-QAM (Quadrature Amplitude Modulation) (Col. 12, lines 54-62). The control section 8 generates the control data (first control information) which (assigns/maps) lowers (maps using the control section 8 in Fig. 3) the transmission power by 1 dB (1st value) if the carrier to interference power ratio I/C is larger than a first threshold value, generates the control data which raises (reassigns) the transmission power by 1 dB (2nd value) if the carrier to interference power ratio I/C is smaller than a second threshold value, and generates (modulates) the control data (first control information) which holds the current transmission power (which is interpreted as a value of zero (0) dB being mapped to a zero amplitude value of the amplitude modulated signal; 3rd value) if the carrier to interference power ratio I/C is between the first and the second threshold values. Based on these control data, the control symbol S9 is generated (Col. 6, lines 15-25; Fig. 1; Fig 1, 3, 4, 5, 8, and 9). Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the apparatus Bohnke,

Takeuchi, and Struhsaker to adjust the power values of various mobile terminals in order to conserve resources and reduce interference among various wireless/mobile terminals.

44. As to claim 36, Bohnke, Takeuchi, and Struhsaker shows all the elements except a scaling device for multiplying the amplitude modulated one of the In-phase and Quadrature components by a first scaling factor, said first scaling factor being a function of downlink quality report information so far received from the wireless terminal to which the modulated one of the In-phase and Quadrature components corresponds.

However, Minami et al. show a scaling device for multiplying the amplitude modulated one of the In-phase and Quadrature components by a first scaling factor, said first scaling factor being a function of downlink quality report information so far received from the wireless terminal to which the modulated one of the In-phase and Quadrature components corresponds comprising an amplifier (18) (scaling device, Fig. 3) multiplying the amplitude modulated one of the In-phase and Quadrature components by a first scaling factor, said first scaling factor being a function of downlink quality report information so far received from the wireless terminal to which the modulated one of the In-phase and Quadrature components corresponds comprising the base station and the communication terminal device check the reception power (or the quality of reception signal) between each other and inform each other of the checked result to form a feedback loop, so that communication under minimum transmission power, so-called transmission power control, is performed. Thereby, the

cellular wireless communication system can efficiently communicate under minimum transmission power and reduce power consumption comparing to the case of communicating under constant power (Col. 1, lines 26-35).

Regarding the scaling factor, Minami et al. show the changeable gain amplifier 18 (apparatus; scaling device) receives the power control signal S8 from the control section 8, and amplifies the transmission signal S13 (multiplies) by the gain value (scaling factor) based on the power control signal S8 so as to generate the transmission signal S14 of transmission power instructed by the base station 2. The transmitting circuit 19 performs a predetermined high frequency processing such as frequency conversion on the transmission signal S14 to generate transmission signal S15, which is transmitted via an antenna 20. Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the apparatus Bohnke, Takeuchi, and Struhsaker to control the power being transmitted to reduce interference in the network and also to extend the battery life of the mobile station.

45. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bohnke (6,160,791), in view of Takeuchi (6,408,038), further in view of Struhsaker (5,923,651), in further view of Sakoda et al. (6,230,022).

46. As to claim 38, Bohnke shows an apparatus with the means for allocating tones used to transmit power control signals when at least some of said first set of modulated power control signals being modulated on different tones during different orthogonal

frequency division multiplexed symbol transmission time periods comprising modulation means for modulating information to be transmitted in said signals (power control signals) onto a number of subcarriers (different tones) in the frequency domain according to an OFDM-modulation method, said information including a power control information generated in a power control information means, whereby one of said subcarriers carries a phase reference information, transformation means for transforming said modulated signals into the time domain (that includes plurality of OFDM time periods) and transmission means for transmitting said transformed signals (Col. 2, lines 8-17).

However, Bohnke, Takeuchi, and Struhsaker does not show an apparatus with the means for a first predetermined frequency hopping pattern said tones assigned according to the first frequency hopping pattern including a first set of modulated power control signals.

Sakoda et al. show the tones used to modulate said first set of modulated power control signals is determined by a first predetermined hopping sequence comprising one frequency slot is comprised of plural orthogonal sub-carriers, and, at the time of communication, information to be transmitted (power control information) is allocated to the plural sub-carriers and then transmitted by utilizing the frequency slot (Fig. 4). Therefore, the information to be transmitted can be distributed on the frequency axis and transmitted (Col. 6, lines 59-65). Further, a frequency slot to be used for communication is changed, temporally, on the basis of a stated pattern (predetermined pattern), that is, a frequency hopping is performed. Sakoda et al. further gives an

example where there are nine frequency slots F1 to F9 allocated to the transmitting apparatus 11 and these nine frequency slots F1 to F9 form nine down communication channels A to I, the frequency slots F1 to F9 are not univocally allocated to nine channels of the down communication channels A to I, but each of down communication channels A to I decides the frequency slot F1 to F9 to be used, for each time slot (Fig. 5; Col. 7, lines 1-12).

Therefore, it would have been obvious to one of ordinary skilled in the art to modify the apparatus of Bohnke to provide a predetermined frequency hopping to reduce the level of interference in the OFDM network.

47. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bohnke (6,160,791), in view of Takeuchi (6,408,038), further in view of Struhsaker (5,923,651), in further view of Sakoda et al. (6,230,022), further in view of Nyman et al. (2003/0037033).

48. As to claim 39, Bohnke, Takeuchi, Struhsaker et al., Sakoda et al. show all the elements except an apparatus wherein the first predetermined hopping sequence corresponds to a terminal identifier associated with the wireless terminal.
However, Nyman et al. show an apparatus wherein the first predetermined hopping sequence corresponds to a terminal identifier associated with the wireless terminal comprising the first predetermined hopping sequence corresponds to a terminal identifier associated with the first wireless terminal comprising the pattern of the hops

(frequency hopping sequence) is a pseudo-random pattern, which is based on the device's Bluetooth Device (wireless terminal; apparatus) Address (BD_ADDR) value (Paragraph 0164; Fig. 2A). Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the apparatus of Bohnke to provide frequency hopping sequence based on a terminal identifier so as to achieve unique hopping sequence based on the individual wireless device, thus reducing interference overall in the network.

49. As to claim 41, Bohnke shows an apparatus wherein said transmitter transmits a plurality of power control signals to said first wireless terminal over a period of time comprising modulation means for modulating information to be transmitted in said signals (plurality of power control signals) onto a number of sub carriers in the frequency domain according to an OFDM-modulation method, said information including a power control information generated in a power control information means, whereby one of said sub carriers carries a phase reference information, transformation means for transforming said modulated signals into the time domain (that is, over a period of time) and transmission means for transmitting said transformed signals to other mobile station (apparatus) (Col. 2, lines 8-17; Fig. 2).

Bohnke does not show means for transmitting a periodic device identifier signal on the second single one of the In-phase and Quadrature signal components on less than 50% of the power control signals transmitted to said wireless terminal.

However, MPEP 2144.05 states the following:

II. OPTIMIZATION OF RANGES

A. Optimization Within Prior Art Conditions or Through Routine Experimentation

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be *prima facie* obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), *cert. denied*, 493 U.S. 975 (1989); *In re Kulling*, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and *In re Geisler*, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997).

50. As to claim 44, Bohnke show an apparatus wherein one of the possible modulated signal values corresponds to a control command indicating no change in power; and wherein transmitting said first control information includes transmitting said signal tone with zero power when said first control information indicates no change in power comprising information to be transmitted in signals is modulated onto a number of subcarriers in a frequency domain. The information to be transmitted (by a transmitter

12 in Fig. 2) by means of said subcarriers comprises normal data information and power control information (said first control signal), which is transmitting said first control information. The power control information is used to control the transmission power of a bidirectional communication system. Thereby, the principle of the power control is to maintain a certain quality of transmission for the transmitted signals. Bohnke further shows by example where the power control of a bidirectional communication system includes a station A (first wireless terminal) and a station B (wireless terminal/base station). If the station B receives signals from the station A, station B detects the quality of the received signals and asks the station A by transmitting a power control information to increase, keep (no change in power, which is also interpreted as zero power) or decrease the transmission power of the station A. The station A receives therefore the power control demand (on said first control signal) from the station B and adjusts its transmission power correspondingly. If the station A receives signals from the station B, the station A detects the quality of the received signals and asks the station B by transmitting a power control information to increase, keep or decrease the transmission power of the station B. The station B therefore receives the power control demand from the station A and adjusts its transmission power correspondingly. So each of the stations controls the transmission power of the other station (Col. 1, lines 17-39; Fig. 2 and 3).

51. As to claim 45, Bohnke, Takeuchi, and Struhsaker show all the elements except an apparatus wherein said apparatus is a sectorized base station and wherein said

transmitter is a transmitter in a sector of the sectorized base station, said apparatus including: a control module for controlling a second sector adjacent to said first base station to leave the tone used by said first power control signal unused in said second sector when said first control signal is transmitted.

However, Hornsby et al. show wherein said apparatus is a sectorized base station and wherein said transmitter is a transmitter in a sector of the sectorized base station, said apparatus including: a control module for controlling a second sector adjacent to said first base station to leave the tone used by said first power control signal unused in said second sector when said first control signal is transmitted: operating the base station to control a second sector adjacent to said first base station to leave the tone used by said first power control signal unused in said second sector when said first control signal is transmitted comprising a sectorized/cellular environment where the available frequency (signal containing control and data info) is divided such that the downstream and upstream channels (containing power control information) assigned to each CPE (terminal) are interleaved/controlled (same frequency/tone is left, not used in the adjacent sector/cell) with those assigned to CPEs (terminals/apparatus) in other sectors or cells. Thus, some communication channels are not available to the CPEs (terminals) of a particular sector or cell (Col. 5, lines 44-49; Fig. 1). The base station is shown in Fig. 1 as a headend transceiver. Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the apparatus of Bohnke, Takeuchi, and Struhsaker to leave the tones in adjacent sectors/cells to reduce interference.

52. Claims 46, 48, 49, 54, 56, 57 are rejected under 35 U.S.C. 102(b) as being unpatentable by Minami et al. (6,587,510).

53. As to claim 46, Minami et al. show periodically receiving control signals corresponding to said wireless terminal, each control signal having control information of a first type, corresponding to one of at least three different values, amplitude modulated on a first single one of an In-phase component and a Quadrature phase component of a single tone during a single orthogonal frequency division multiplexed symbol transmission time period; and determining from the magnitude of said first single one of said In-phase and Quadrature phase signal components of each received control signal an amount of an adjustment to be made, said adjustment corresponding to the control information type comprising a receiving apparatus (3) for receiving, from a communication partner, control symbols obtained by assigning control information for controlling transmission power to symbols of phase modulation, so as to control its own transmission power based on the control symbols (Col. 2, lines 53-58).

Further, Minami et al. show wherein the terminal receives said control information that is a single value which can be any one of at least three values, one of said at least 3 values being zero indicating no change in transmission power is to be made by said first wireless terminal, said step of modulating control information including mapping said single value to one of at least three signal amplitude levels, a zero control value being mapped to a zero amplitude value of the amplitude modulated signal comprising

the control data are assigned to symbols of other phase modulation (step of modulation) such as 8-PSK (Phase Shift Keying) and 16-QAM (Quadrature Amplitude Modulation) (Col. 12, lines 54-62). The control section 8 (determines) generates the control data (first control information) which (assigns/maps) lowers the transmission power by 1 dB (amount of adjustment) (1st value) if the carrier to interference power ratio I/C is larger than a first threshold value, generates the control data which raises (reassigns) the transmission power by 1 dB (2nd value) if the carrier to interference power ratio I/C is smaller than a second threshold value, and generates (modulates) the control data (first control information) which holds the current transmission power (which is interpreted as a value of zero (0) dB being mapped to a zero amplitude value of the amplitude modulated signal; 3rd value) if the carrier to interference power ratio I/C is between the first and the second threshold values. Based on these control data, the control symbol S9 is generated (Col. 6, lines 15-25; Fig. 1; Fig 1, 3, 4, 5, 8, and 9).

54. Claims 47 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minami et al. (6,587,510), in view of Takeuchi (6,408,038).

55. As to claim 47, Minami et al. show a method where the first type of information is one of power control information comprising the control section 8 generates power a control signal for controlling its own transmission power based on the control data sent from the receiving section 7, and sends this to the transmitting section 9. (Col. 4, lines 55-58).

However, Minami et al. do not show said first type of information is timing control information and frequency control information.

Takeuchi shows show a method wherein said first control information is transmission frequency control information, and transmission timing control information corresponding to said wireless terminal comprising an AFC (automatic frequency control) circuit that receives the synchronous TFPR signal, and obtains a frequency error (said first control information) and a timing error of the received signal to control the frequency and the timing. Further, with the TFPR signal, the frequency and timing of the having received signal or the receiving signal (by a receiver 4; apparatus in Fig. 7) are controlled (said frequency control information) (Col. 3, lines 16-18; Fig. 7). Thus, the frequency of a carrier of the receiver side can be exactly controlled that is, controlling said first control information that includes frequency control information. Therefore, it would have been obvious to one of ordinary skilled in the art to modify the method of Minami et al. to include frequency information for timely synchronization and avoid data loss and interference.

56. As to claim 48, Minami et al. show operating the wireless terminal to perform a transmission power adjustment operation in response to the determined magnitude of at least one of said first single one of said In-phase and Quadrature phase signal components comprising the control data are assigned to symbols of other phase modulation (step of modulation) such as 8-PSK (Phase Shift Keying) and 16-QAM (Quadrature Amplitude Modulation) (Col. 12, lines 54-62). The control section 8

(determines) generates the control data (first control information) which (assigns/maps) lowers the transmission power by 1 dB (amount of adjustment) (1^{st} value) if the carrier to interference power ratio I/C is larger than a first threshold value, generates the control data which raises (reassigns) the transmission power by 1 dB (2^{nd} value) if the carrier to interference power ratio I/C is smaller than a second threshold value, and generates (modulates) the control data (first control information) which holds the current transmission power (which is interpreted as a value of zero (0) dB being mapped to a zero amplitude value of the amplitude modulated signal; 3^{rd} value) if the carrier to interference power ratio I/C is between the first and the second threshold values. Based on these control data, the control symbol S9 is generated (Col. 6, lines 15-25; Fig. 1; Fig 1, 3, 4, 5, 8, and 9).

57. As to claim 49, Minami et al. show wherein a determined magnitude of approximately zero for said first single one of said In-phase and Quadrature phase signal components indicates no transmission power adjustment is to be made comprising a receiving apparatus (3) for receiving, from a communication partner, control symbols obtained by assigning control information for controlling transmission power to symbols of phase modulation, so as to control its own transmission power based on the control symbols (Col. 2, lines 53-58). Further, the control section 8 of the receiving section (receiver) generates the control data (first control information) which (assigns) lowers the transmission power by 1 dB (1^{st} value) if the carrier to interference power ratio I/C is larger than a first threshold value, generates the control data which

raises (reassigns) the transmission power by 1 dB (2^{nd} value) if the carrier to interference power ratio I/C is smaller than a second threshold value, and generates (modulates) the control data (first control information) which holds the current transmission power (no power adjustment) (which is interpreted as a value of zero (0) dB; 3^{rd} value) if the carrier to interference power ratio I/C is between the first and the second threshold values. Based on these control data, the control symbol S9 is generated (Col. 6, lines 15-25; Fig. 1; Fig 1, 3, 4, 5, 8, and 9).

58. Claims 51, 52, 53, 59, and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minami et al. (6,587,510), in view of Takeuchi (6,408,038), in further view of Love et al. (2002/0145985).

59. As to claim 51, Minami et al. and Takeuchi show all the elements except a method disregarding the received power control information when said checking indicates said signal on the second one of the In-phase and Quadrature components is not for said wireless terminal.

However, Love et al. show a method disregarding the received power control information when said checking indicates said signal on the second one of the In-phase and Quadrature components is not for said wireless terminal comprising DPTRCH frames includes fields that are always sent (e.g., power control bits, pcb's, that is, power control information on the signal that is made up of In-phase and quadrature components in parent claims) and fields which are only sent when mobile unit 104

(wireless terminal) is receiving the SHCCH (e.g., a pointer field, or pntr) then a relative energy (power) comparison is possible. That is, processor 114 (of the wireless terminal in Fig. 1) determines energy of the pointer field (`Eptr`) and energy of the power control bits (`Epcb`). Processor 114 compares Eptr to Epcb, for example by determining a ratio Eptr/Epcb, and compares the data field energy comparison to a comparison threshold stored in memory 116 (e.g., comparing Eptr/Epcb to a threshold_4). Processor 114 of the wireless terminal then determines whether to ignore a frame or decode a frame based on the comparison of the data field energy comparison to the comparison threshold (Page 10, paragraph 0105). Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the method of Minami et al. and Takeuchi to prevent receiving data, which was intended for another mobile unit and thus prevent from incorrectly decoding data that was intended for the mobile unit.

60. As to claim 52, Minami et al. and Takeuchi show all the except ignoring a received control signal when the power of the second one of the In-phase and Quadrature phase components of said signal is above a preselected threshold.

However Love et al. show ignoring a received control signal when the power of the second one of the In-phase and Quadrature phase components of said signal is above a preselected threshold comprising DPTRCH frames includes fields that are always sent (e.g., power control bits, pcb's, that is, power control information on the signal that is made up of In-phase and quadrature components in parent claims) and fields which are only sent when mobile unit 104 (wireless terminal) is receiving the

SHCCH (e.g., a pointer field, or pntr) then a relative energy (power) comparison is possible. That is, processor 114 (of the wireless terminal in Fig. 1) determines energy of the pointer field (`Eptr`) and energy of the power control bits (`Epcb`). Processor 114 compares Eptr to Epcb, for example by determining a ratio Eptr/Epcb, and compares the data field energy comparison to a comparison threshold stored in memory 116 (e.g., comparing Eptr/Epcb to a threshold_4). Processor 114 of the wireless terminal then determines whether to ignore a frame or decode a frame based on the comparison of the data field energy comparison to the comparison threshold (predetermined threshold) (Page 10, paragraph 0105). Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the method of Minami et al. and Takeuchi to prevent receiving data, which was intended for another mobile unit and thus prevent from incorrectly decoding data that was intended for the mobile unit.

61. As to claim 53, Minami et al. show a method where said threshold is a power level threshold corresponding to a preselected level of signal noise comprising a receiving apparatus (3) for receiving, from a communication partner, control symbols obtained by assigning control information for controlling transmission power to symbols of phase modulation, so as to control its own transmission power based on the control symbols (Col. 2, lines 53-58). Further, the control section 8 of the receiving section (receiver) generates the control data (first control information) which (assigns) lowers the transmission power by 1 dB (1^{st} value) if the carrier to interference power ratio I/C is larger than a first threshold value, generates the control data which raises (reassigns)

the transmission power by 1 dB (2nd value) if the carrier to interference power ratio I/C (interpreted as signal noise ratio threshold) is smaller than a second threshold value, and generates (modulates) the control data (first control information) which holds the current transmission power (no power adjustment) (which is interpreted as a value of zero (0) dB; 3rd value) if the carrier to interference power ratio I/C is between the first and the second threshold values. Based on these control data, the control symbol S9 is generated (Col. 6, lines 15-25; Fig. 1; Fig 1, 3, 4, 5, 8, and 9).

62. As to claim 54, Minami et al. show a receiver for receiving control signals corresponding to said wireless terminal, each control signal having control information of a first type, corresponding to one of at least three different values, amplitude modulated on a first single one of an In-phase component and a Quadrature phase component of a single tone during a single orthogonal frequency division multiplexed symbol transmission time period; and means for determining from the magnitude of said first single one of said In-phase and Quadrature phase signal components of each received control signal an amount of an adjustment to be made, said adjustment corresponding to the control information type comprising a receiving apparatus (3) for receiving, from a communication partner, control symbols obtained by assigning control information for controlling transmission power to symbols of phase modulation, so as to control its own transmission power based on the control symbols (Col. 2, lines 53-58).

Further, Minami et al. show wherein the terminal receives said control information that is a single value which can be any one of at least three values, one of said at least

3 values being zero indicating no change in transmission power is to be made by said first wireless terminal, said step of modulating control information including mapping said single value to one of at least three signal amplitude levels, a zero control value being mapped to a zero amplitude value of the amplitude modulated signal comprising the control data are assigned to symbols of other phase modulation (step of modulation) such as 8-PSK (Phase Shift Keying) and 16-QAM (Quadrature Amplitude Modulation) (Col. 12, lines 54-62). The control section 8 (determines) generates the control data (first control information) which (assigns/maps) lowers the transmission power by 1 dB (amount of adjustment) (1st value) if the carrier to interference power ratio I/C is larger than a first threshold value, generates the control data which raises (reassigns) the transmission power by 1 dB (2nd value) if the carrier to interference power ratio I/C is smaller than a second threshold value, and generates (modulates) the control data (first control information) which holds the current transmission power (which is interpreted as a value of zero (0) dB being mapped to a zero amplitude value of the amplitude modulated signal; 3rd value) if the carrier to interference power ratio I/C is between the first and the second threshold values. Based on these control data, the control symbol S9 is generated (Col. 6, lines 15-25; Fig. 1; Fig 1, 3, 4, 5, 8, and 9).

63. As to claim 55, Minami et al. show a method where the first type of information is one of power control information comprising the control section 8 generates power a control signal for controlling its own transmission power based on the control data sent

from the receiving section 7, and sends this to the transmitting section 9. (Col. 4, lines 55-58).

However, Minami et al. do not show said first type of information is timing control information and frequency control information.

Takeuchi shows show a method wherein said first control information is transmission frequency control information, and transmission timing control information corresponding to said wireless terminal comprising an AFC (automatic frequency control) circuit that receives the synchronous TFPR signal, and obtains a frequency error (said first control information) and a timing error of the received signal to control the frequency and the timing. Further, with the TFPR signal, the frequency and timing of the having received signal or the receiving signal (by a receiver 4; apparatus in Fig. 7) are controlled (said frequency control information) (Col. 3, lines 16-18; Fig. 7). Thus, the frequency of a carrier of the receiver side can be exactly controlled that is, controlling said first control information that includes frequency control information. Therefore, it would have been obvious to one of ordinary skilled in the art to modify the method of Minami et al. to include frequency information for timely synchronization and avoid data loss and interference.

64. As to claim 56, Minami et al. show the means for performing a transmission power adjustment operation in response to the determined magnitude of at least one of said first single one of said In-phase and Quadrature phase signal components comprising the control data are assigned to symbols of other phase modulation (step of

modulation) such as 8-PSK (Phase Shift Keying) and 16-QAM (Quadrature Amplitude Modulation) (Col. 12, lines 54-62). The control section 8 (determines) generates the control data (first control information) which (assigns/maps) lowers the transmission power by 1 dB (amount of adjustment) (1st value) if the carrier to interference power ratio I/C is larger than a first threshold value, generates the control data which raises (reassigns) the transmission power by 1 dB (2nd value) if the carrier to interference power ratio I/C is smaller than a second threshold value, and generates (modulates) the control data (first control information) which holds the current transmission power (which is interpreted as a value of zero (0) dB being mapped to a zero amplitude value of the amplitude modulated signal; 3rd value) if the carrier to interference power ratio I/C is between the first and the second threshold values. Based on these control data, the control symbol S9 is generated (Col. 6, lines 15-25; Fig. 1; Fig 1, 3, 4, 5, 8, and 9).

65. As to claim 57, Minami et al. show wherein a determined magnitude of approximately zero for said first single one of said In-phase and Quadrature phase signal components indicates no transmission power adjustment is to be made comprising a receiving apparatus (3) for receiving, from a communication partner, control symbols obtained by assigning control information for controlling transmission power to symbols of phase modulation, so as to control its own transmission power based on the control symbols (Col. 2, lines 53-58). Further, the control section 8 of the receiving section (receiver) generates the control data (first control information) which (assigns) lowers the transmission power by 1 dB (1st value) if the carrier to interference

power ratio I/C is larger than a first threshold value, generates the control data which raises (reassigns) the transmission power by 1 dB (2nd value) if the carrier to interference power ratio I/C is smaller than a second threshold value, and generates (modulates) the control data (first control information) which holds the current transmission power (no power adjustment) (which is interpreted as a value of zero (0) dB; 3rd value) if the carrier to interference power ratio I/C is between the first and the second threshold values. Based on these control data, the control symbol S9 is generated (Col. 6, lines 15-25; Fig. 1; Fig 1, 3, 4, 5, 8, and 9).

66. As to claim 59, Minami et al. and Takeuchi show all the elements except a method disregarding the received power control information when said checking indicates said signal on the second one of the In-phase and Quadrature components is not for said wireless terminal.

However, Love et al. show a method disregarding the received power control information when said checking indicates said signal on the second one of the In-phase and Quadrature components is not for said wireless terminal comprising DPTRCH frames includes fields that are always sent (e.g., power control bits, pcb's, that is, power control information on the signal that is made up of In-phase and quadrature components in parent claims) and fields which are only sent when mobile unit 104 (wireless terminal) is receiving the SHCCH (e.g., a pointer field, or pntr) then a relative energy (power) comparison is possible. That is, processor 114 (of the wireless terminal in Fig. 1) determines energy of the pointer field (`Eptr`) and energy of the power control

bits (`Epcb`). Processor 114 compares Eptr to Epcb, for example by determining a ratio Eptr/Epcb, and compares the data field energy comparison to a comparison threshold stored in memory 116 (e.g., comparing Eptr/Epcb to a threshold_4). Processor 114 of the wireless terminal then determines whether to ignore a frame or decode a frame based on the comparison of the data field energy comparison to the comparison threshold (Page 10, paragraph 0105). Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the method of Minami et al. and Takeuchi to prevent receiving data, which was intended for another mobile unit and thus prevent from incorrectly decoding data that was intended for the mobile unit.

67. As to claim 60, Minami et al. and Takeuchi show all the except ignoring a received control signal when the power of the second one of the In-phase and Quadrature phase components of said signal is above a preselected threshold.

However Love et al. show a method of ignoring a received control signal when the power of the second one of the In-phase and Quadrature phase components of said signal is above a preselected threshold comprising DPTRCH frames includes fields that are always sent (e.g., power control bits, pcb's, that is, power control information on the signal that is made up of In-phase and quadrature components in parent claims) and fields which are only sent when mobile unit 104 (wireless terminal) is receiving the SHCCH (e.g., a pointer field, or pntr) then a relative energy (power) comparison is possible. That is, processor 114 (of the wireless terminal in Fig. 1) determines energy of the pointer field (`Eptr`) and energy of the power control bits (`Epcb`). Processor 114

compares Eptr to Epcb, for example by determining a ratio Eptr/Epcb, and compares the data field energy comparison to a comparison threshold stored in memory 116 (e.g., comparing Eptr/Epcb to a threshold_4). Processor 114 of the wireless terminal then determines whether to ignore a frame or decode a frame based on the comparison of the data field energy comparison to the comparison threshold (predetermined threshold) (Page 10, paragraph 0105). Therefore, it would have been obvious to one of ordinary skilled in the art at the time of invention to modify the method of Minami et al. and Takeuchi to prevent receiving data, which was intended for another mobile unit and thus prevent from incorrectly decoding data that was intended for the mobile unit.

Allowable Subject Matter

68. Claims 16, 22, 23, 26, 27, 37, 40, 42, 43, 50, and 58 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

69. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Any inquiry concerning this communication or earlier communications from the examiner should be directed to VAIBHAV (MANU) SAWHNEY whose telephone number is 571-272-9738. The examiner can normally be reached on Monday - Friday 10:00AM - 19:30 EST, alt. fri. off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, KWANG B. YAO can be reached on 571-272-3182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Vaibhav S.

VAIBHAV (MANU) SAWHNEY

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